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Parent-child communication and academic performance

Associations at the within- and between-country level

Abstract

Theoretically, one would expect parental involvement to be more effective for school success when parents are more educated. But empirical evidence, mostly based on U.S. datasets, provides inconsistent findings. This paper examines the association of parent-child communication, a form of parental involvement, and academic achievement by levels of parental education in 33 educational systems that participated in the Progress in International Reading Literacy Study (PIRLS) 2006 and 39 in the Programme for International Student Assessment (PISA) 2000. The results indicate a positive interaction of parent-child communication and parental education in 5 primary school systems (PIRLS) and 14 secondary school systems (PISA), including the U.S. The interaction strength varies across educational systems, but no clear pattern emerged for national income indicators. Only weak evidence of a stronger interaction for lower income and higher income inequality was found, which could suggest that students reap greater rewards of parent-child communication when faced with an adverse national economic environment.

Keywords

Parent-child communication; Parental involvement; PIRLS; PISA

Eltern-Kind-Kommunikation und akademische Leistungen

Assoziationen auf inner- und zwischenstaatlicher Ebene

Zusammenfassung

Theoretisch wäre es erwartungskonform, dass elterliche Mitwirkung umso einflussreicher auf schulischen Erfolg sind, je höher das elterliche Bildungsniveau ist. Jedoch liefert die größtenteils auf US-amerikanischen Datensätzen basierende empirische Evidenz in dieser Hinsicht inkonsistente Befunde. In diesem Beitrag

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werden die Zusammenhänge zwischen der Eltern-Kind-Kommunikation als Form elterlicher Mitwirkung einerseits und schulische Leistungen in Abhängigkeit vom elterlichen Bildungsniveau andererseits in 33 Bildungssystemen, die an der Progress in International Reading Literacy Study (PIRLS) 2006 und in 39 Bildungssystemen, die am Programme for International Student Assessment (PISA) 2000 teilnahmen, untersucht. Die Ergebnisse zeigen positive Interaktionen zwischen Eltern-Kind-Kommunikation und Bildungsniveau der Eltern in 5 Primarschulsystemen (PIRLS) und 14 Sekundarschulsystemen (PISA), unter anderem der Vereinigten Staaten, an. Die Interaktionsstärke variiert zwischen den Bildungssystemen, wobei sich kein deutliches Muster hinsichtlich nationaler Einkommensindikatoren herausbildet. Eine einkommensbedingte Ungleichheit in Form stärkerer Interaktionen, die auf einen größeren, aus Eltern-Kind-Kommunikation resultierenden Ertrag für Schülerinnen und Schüler aus Staaten mit vergleichsweise ungünstiger wirtschaftlicher Lage hindeuten könnte, ist lediglich schwach evident.

Schlagworte
Eltern-Kind-Kommunikation; Elterliche Mitwirkung; PIRLS; PISA

1. Introduction

Research provides inconsistent findings regarding the importance of parent-child communication and other forms of parental involvement activities to children's school success (Domina, 2005; Englund, Luckner, Whaley, & Egeland, 2004; Fan & Chen, 2001; Hoover-Dempsey et al., 2001; Mattingly, Prislin, McKenzie, Rodriguez, & Kayzar, 2002). Some studies report positive associations with academic achievement (Callahan, Rademacher, & Hildreth, 1998; Fan, 2001; Hong & Ho, 2005; Houtenville & Conway, 2008; McWayne, Hampton, Fantuzzo, Cohen, & Sekino, 2004), other studies indicate no association (Barnard, 2004; Fan & Chen, 2001; Mattingly et al., 2002; Patall, Cooper, & Robinson, 2008), and even others point to negative associations (Coleman & McNeese, 2009; Domina, 2005; Fan, 2001; Muller, 1995).

In particular, reported evidence of negative or no association with academic achievement is at odds with a widespread belief of positive parental involvement influences and difficult to reconcile with related theoretical work (Epstein, 1987). Several methodological and theoretical aspects that condition the influence of parental involvement likely explain these mixed and, apparently, discouraging results: the research design, the developmental stage of students, the type of parental involvement strategy considered, and the interaction with family socioeconomic status (SES).

1.1 The research design

For the most part, parental involvement research has relied upon cross-sectional designs. Cross-sectional designs allow researchers to establish significant associations but not the direction of causation (Crosnoe, 2001; Domina, 2005; Hong, Yoo, You, & Wu, 2010; McNeal, 1999). With the observational data researchers cannot manipulate parental involvement conditions or control for unobserved characteristics that could bias the actual effects of parental involvement. Furthermore, since parental involvement both affects and is affected by academic performance, resulting effects might not only reflect actual influences of parental involvement but also how parents react to past performance of students.

In particular, reported negative associations with parental involvement items could be severely affected by reactivity or simultaneity bias if parents get much more involved when children perform poorly in school and then relax their involvement when children are succeeding in school (Bassani, 2006; Jeynes, 2005; Jungbauer-Gans, 2004; Levpušček & Zupančič, 2009). Theoretically, one would need a longitudinal design or at least a pre-test measure to counteract this source of reactivity or simultaneity bias. But even longitudinal studies provide mixed and inconsistent results regarding the direction of the association (Fan, 2001; Hong et al., 2010; Muller, 1998; Singh et al., 1995). Possibly, in addition to the type of design, the varied quality of samples and data collection instruments also help explain prior conflicting results.

1.2 Developmental stage of students

Research shows that parental involvement and its effectiveness declines as children get older (Muller, 1998; Singh et al., 1995; Crosnoe, 2001; Zill & Nord, 1994). In elementary school, parental involvement exerts desirable effects because students have less developed study habits (Dufresne & Kobasigawa, 1989) and parents have greater mastery of the subject matter covered in the early grades (Cooper, 2001). During adolescence, in secondary school, students try to become more independent from parents (Coleman & McNeese, 2009; Erikson, 1968; Gutman & Midgley, 2000; Hill & Holmbeck, 1986) and parent-child conflicts increase (Laursen, Coy, & Collins, 1998). Inasmuch as most research concerning parental involvement influences is based on middle- and high school students, results might have underestimated the importance of parental involvement (Chen & Chandler, 2001; Domina, 2005; Patall et al., 2008).

1.3 The type of involvement

Parental involvement findings will also vary depending on the strategy of involvement concerned. Parental involvement is a multidimensional concept and research

indicates that different involvement dimensions influence academic performance differently (Domina, 2005; Patall et al., 2008; Rogers, Theule, Ryan, Adams, & Keating, 2009). For example, supportive and encouraging parental involvement is typically associated with higher achievement levels (Callahan et al., 1998; Martinez-Pons, 1996; Simpkins, Weiss, McCartney, Kreider, & Dearing, 2006), whereas parental pressure and punishment are negatively associated to school success (Niggli, Trautwein, Schnyder, Ludtke, & Neumann, 2007; Pomerantz & Eaton, 2001).

1.4 Differential influences by family SES

Family SES also conditions the influence of parental involvement. Several studies indicate that parental involvement reaps greater rewards for children of high SES families. It is argued that parent-child communication and discussion, parental encouragement for academic success, and related forms of parental involvement are a more effective force affecting a student's academic achievement whenever parents possess economic, human, and cultural capital (Desimone, 1999; McNeal, 1999; Kim, Hwang, & Shin, 2009; Lee & Bowen, 2006; Park, 2008). But other studies fail to demonstrate a differential influence by family SES or even report contradictory findings; namely, that the effectiveness of parental involvement is greater among low SES families (Domina, 2005; Gregory & Rimm-Kaufman, 2008; Jeynes, 2007; Meehan, Hughes, & Cavell, 2003).

Understanding the differential influence of parent-child communication by family SES is critical for policy decisions. If the influence of parent-child communication exerts greater rewards among students of high SES families, then universal parental involvement interventions will actually tend to exacerbate the SES gap in academic achievement. If, on the contrary, the influence is greater among students of low SES families, then parental involvement programs can contribute to reduce achievement inequalities associated with family background.

1.5 Differential parental involvement influences by country

Prior research draws mostly on U.S. data, but the way in which parental involvement influences schooling outcomes may vary depending on country characteristics (Blossfeld & Shavit 1993; Chiu, 2010; Chiu & Xihua 2008; Park 2008). Three theories anticipate weaker, similar, or stronger influences of parental involvement in richer than in poorer countries: the public resources substitution, the social reproduction, and the complementary intangibles theory, respectively (Blossfeld & Shavit, 1993; Chiu, 2010).

The public resources substitution theory anticipates a weaker association with parental involvement in wealthier societies. It posits that the greater quality and quantity of public resources in wealthier societies reduces the importance of the family role, whereas in poorer societies the limited availability of public resourc-

es cannot compensate for the lack of family resources. The social reproduction theory contends that irrespective of the country's income, high SES families use their superior resources to create equivalent advantages for their children across countries. And the complementary intangibles theory argues that the widespread availability of physical resources in richer countries increases the value of less tangible resources like parental involvement.

Using PISA data of 41 countries, Chiu (2010) and Chiu and Xihua (2008) found a stronger association in richer countries between cultural communication and math achievement. This finding is in line with the complementary intangibles theory: the value of intangible resources increases when physical resources are available. The authors also found that physical family resources are equally associated to achievement across countries, supporting the social reproduction theory for physical resources and that the gap favoring students living with two parents and fewer siblings is larger in richer countries and societies that tend to share individualistic values. Chiu (2010) also postulated a mediating effect of income inequality in the association between family characteristics and student achievement. He argued that greater cooperation among students in more equal societies would tend to weaken the association between family resources and student achievement. But he was unable to support this hypothesis with the data.

In related work, Park (2008) used PISA data of 14 countries to examine parent-child communication influences by family SES. His results suggest that parent-child communication has greater benefits among low SES students in standardized educational systems than in nonstandardized systems. Nonstandardized systems, like in Germany and the United States, require an active engagement from parents to understand the schooling process. Instead, in standardized systems, like in Japan and Korea, room for parental involvement is more limited and information about the educational process is less important. To the extent that low SES parents are less likely to actively engage in school issues, for example, by discussing with teachers about the specific educational needs of their child, then children of low SES families are most favored within standardized educational systems.

2. Aim of the paper

The paper contributes to answer two research questions: (1) Does the influence of parent-child communication on academic performance vary by parental education levels? and (2) Does the interaction of parent-child communication and parental education vary across countries with national income levels and distribution? To this end, the pattern of the association of reading performance and parent-child communication by levels of parental education is examined using data from the Progress in International Reading Literacy Study (PIRLS) 2006 and the Programme for International Student Assessment (PISA) 2000.

The selected studies are the most recent international reading assessments collecting parent-child communication data in all participating countries (PISA 2009 collected these data in a subset of countries only). Importantly, it is not the goal of this paper to compare PIRLS and PISA results. These studies have critical differences with regard to the conceptual definition of reading literacy, country participation, sample design, and instrumentation. And these differences seriously limit the possibilities for comparisons. Rather than being comparable, the results of these studies are regarded as complementary.

The analyses provide international evidence based on 33 primary school systems (4th graders in PIRLS) and 39 secondary school systems (15-year-olds in PISA). Previous research is based mostly on U.S. datasets and has reported equivocal results. The international evidence reported here is relevant to theoretical work anticipating a differential association with family variables for country's characteristics (Blossfeld & Shavit, 1993; Chiu, 2010; Chiu & Xihua, 2008; Park 2008) and helps illuminate inconsistent findings in the U.S. The studies by Chiu (2010) and Park (2008) analyzed secondary school systems participating in PISA, but international evidence in primary schools is lacking, although the research suggests that the association with parent-child communication varies for the school stage. The analysis of PIRLS could contribute to fill this gap.

The analyses focus on one single-dimension of parental involvement and family SES: parent-child communication and parental education. Park (2008) considered various dimensions of parental involvement and a composite SES measure. But, in unreported analyses, some of the involvement dimensions related to schooling issues he considered were negatively correlated to student achievement in PIRLS and PISA, probably reflecting reactivity bias. Here, the selected parent-child communication variable was positively (albeit moderately) correlated with student achievement. And the parental education variable captures more precisely than SES the mechanism postulated by the theory: parent-child communication influences are expected to vary by parental education levels irrespective of other family SES characteristics.

But the analyses are not without limitations. The parent-child communication variable is based on a single item and not on a reliable scale. And, despite its positive correlation with achievement, this variable might still not be exempt from reactivity. The communication and socioeconomic variables are reported by students in PISA and this information tends to be less reliable than the one reported by parents. Also, as discussed earlier, the cross-sectional datasets can establish associations but not causation. Due to these and other limitations explained in more detail in the final section, results should be interpreted with caution and not be easily generalized.

Overall, the analyses contribute to answering but cannot answer the research questions sufficiently. These questions should be addressed with more appropriate methods. That said, the results from these datasets do add significantly to existing evidence on the patterns concerned and contribute to the production of knowledge in the area of parent-child communication research (Haig, 2005).

3. Methods

3.1 Data

The data stem from PIRLS 2006 and PISA 2000 managed by the by International Association for the Evaluation of Educational Achievement (IEA) and the Organisation for Economic Co-operation and Development (OECD). PIRLS 2006 and PISA 2000 assessed student reading achievement. Target populations are 4th graders and 15-year-olds in 45 and 43 educational systems, respectively. PISA 2000 is the first study cycle and PIRLS 2006 the second and latest. PISA shifts the focus of assessment every 3 years. The primary focus in PISA 2000 and PISA 2009 was reading, but parent-child communication data in PISA 2009 was collected only in a subset of countries. Countries with more than 50 % of missing values in independent variables are dropped from the analysis: England, Scotland, South Africa, and the United States in PIRLS 2006 and Japan in PISA 2000. Luxemburg and Liechtenstein are excluded for having a small number of sampled schools, country's 5th grade samples for not being part of the target population, regional samples in Belgium and Canada (PIRLS) because they cannot be assigned country indicators for three level analysis, and Netherlands in PISA 2000 due to the low participation rate. As a result, analytic samples include 33 educational systems in PIRLS 2006 and 39 in PISA 2000.

3.2 Measures

Reading achievement: PIRLS and PISA employ item response theory (IRT) scaling methods to measure reading achievement in a single composite scale. PIRLS used a three-parameter model for multiple-choice items and a two-parameter model for items with two response options (Martin, Mullis, & Kennedy, 2007). PISA applied a generalized version of the one-parameter Rash model (Adams & Wu, 2002). Both studies scale achievement variables to have an average score of 500 and a standard deviation of 100, and provide five plausible scores based on responses of students to sub-tests. These five scores are used simultaneously in the analysis to account for imputation uncertainty.

Parent-child communication (TALK): TALK reflects the extent to which parents talk to children irrespective of type and intent of communication. TALK in PIRLS 2006 is the frequency parents report "talking to children about things they have done" on a Likert scale (1–4). In PISA 2000, TALK measures the extent to which parents "spend time just talking to students" as reported by students on a Likert scale (1–5).

Parental education (PARED): Information on the highest level of education attained by the mother and father was reported by students in PISA 2000 and by parents in PIRLS 2006. Responses in PIRLS 2006 were grouped into five inter-

nationally comparable categories: (1) finished some primary or lower-secondary or did not go to school, (2) lower-secondary education, (3) upper-secondary education, (4) post-secondary education but not university, (5) university or higher. Responses in PISA 2000 were grouped into six categories: (1) did not go to school, (2) primary education, (3) lower-secondary education, (4) upper-secondary education aimed at providing direct entry into the labor market, (5) upper-secondary education aimed at gaining entry into tertiary education, (6) and tertiary education.

National income (GNI): It is the gross national income per capita with comparable purchasing power across countries (PPP). Data source is the World Bank.

Income inequality (GINI): It measures the degree of income inequality. Coefficients range from 0 to 100, where 0 corresponds to perfect equality and 100 to complete inequality. Data source is the World Bank.

3.3 Analytical strategy

The statistical analysis includes simple bivariate associations and more complex regression techniques that account for missing data uncertainty and the multilevel structure of the data (i.e., students nested in schools and schools nested in countries). Missing data uncertainty in the dependent variable was handled with five plausible scores (Foy & Kennedy, 2008) and in the independent variables with multiple imputation. In particular, five imputed datasets of independent variables were created in Stata/SE v.11 using data augmentation (DA), an iterative Markov chain Monte Carlo (MCMC) procedure that assumes a multivariate normal distribution for the data (Gelman, Carlin, Stern, & Rubin, 2004; StataCorp, 2009).

Country regressions analyze associations at the within-country level and three-level models explore interactions with country-level variables. Country regressions take into account the complex sample design with a set of jackknife (PIRLS) and balanced repeated (PISA) replicate weights. They were estimated with the IEA's International Database (IDB) Analyzer software (IEA, 2011), applying Rubin's (1987) rule to calculate standard errors based on the five imputed datasets. Three-level models of students nested in schools and schools nested in countries were estimated with HLM (Raudenbush & Bryk, 2002).

Country regressions take the following specification

$$Y_{it} = \alpha_0 + \alpha_1 PARED_{ij} + \alpha_2 TALK_{ij} + \alpha_3 PARED_{ij} TALK_{ij} + \varepsilon_{ij} \quad (1)$$

where the variables *Y,* PARED, and TALK represent the reading score, parental education, and parent-child communication, respectively, for each student *i,* in school *j*. Parameter α_2 captures the direct association with TALK after controlling for PARED. The critical parameter is α_3. It evaluates whether the association with TALK changes across levels of PARED. Or, alternatively, if the association with

PARED increases, decreases, or remains unchanged across levels of TALK. A positive estimate of α_3 would suggest that parent-child communication is more effective when parents have higher levels of education and vice versa.

Three-level models evaluate whether the associations vary by national income characteristics. They are estimated for the complete international sample of students (i) nested in schools (j) and schools nested in countries (k). The full model specification is

$$Y_{ijk} = \pi_{0jk} + \pi_{1jk}PARED_{ijk} + \pi_{2jk}TALK_{ijk} + \pi_{3jk}PARED_{ij}\text{x}TALK_{ijk} + \varepsilon_{ikj} \quad (2)$$

$$\pi_{0jk} = \beta_{00k} + r_{0jk} \quad (3)$$

$$\pi_{1jk} = \beta_{10k} \quad (4)$$

$$\pi_{2jk} = \beta_{20k} \quad (5)$$

$$\pi_{3jk} = \beta_{30k} \quad (6)$$

$$\beta_{00k} = \gamma_{000} + \gamma_{001}GINI + \gamma_{002}\,\mathbf{ln}(GNI)_k + u_{00k} \quad (7)$$

$$\beta_{10k} = \gamma_{100} + \gamma_{101}GINI + \gamma_{102}\,\mathbf{ln}(GNI)_k + u_{10k} \quad (8)$$

$$\beta_{20k} = \gamma_{200} + \gamma_{201}GINI + \gamma_{202}\,\mathbf{ln}(GNI)_k + u_{20k} \quad (9)$$

$$\beta_{30k} = \gamma_{300} + \gamma_{301}GINI + \gamma_{302}\,\mathbf{ln}(GNI)_k + u_{30k}\,, \quad (10)$$

where parameter γ_{200} in equation (9) captures the association with TALK after controlling for PARED and parameter γ_{300} in equation (10) evaluates if the association with TALK varies by levels of PARED. Intuitively, these parameters are similar to α_2 and α_3 in equation (1), but capture the average association across schools and across countries. At the between-country level, parameters γ_{301} and γ_{302} in equation (10) evaluate if the association with PARED x TALK varies for the country's income inequality (GINI) and income per capita (GNI), respectively. And parameters γ_{201} and γ_{202} in equation (9) evaluate if the association with TALK varies by GINI and GNI, respectively. The natural logarithm (ln) of GNI reduces the effect of extreme values in GNI.

All independent variables were grand mean centered for the country regressions and three-level model analyses to facilitate interpretation of interaction effects. Country regressions do not distinguish associations within schools from associations between schools. In educational systems where schools are highly segregated by SES, student level coefficients will also reflect associations with school variables. Omitted school variables likely introduce a bias into the PARED and TALK

coefficients, but unreported analysis controlling for school effects convey more or less same estimates of the interaction of PARED x TALK, the core of our analysis. Rather than attempting to control for other plausible explanations, the country regression approach is regarded only as a means for evaluating whether the association with PARED changed for the sample of students with higher PARED and lower PARED, as it is assumed that in no case it can provide evidence of causation. The three-level models yield within-school estimates and are not comparable with the country regression estimates.

4. Results

4.1 Associations at the within-country level

The first column of Tables 1 and 2 reports the correlation of reading achievement and TALK in PIRLS and PISA. Correlations are positive in most PIRLS and PISA educational systems, ranging from -.01 to .27 in PIRLS and .04 to .34 in PISA. Particularly low are correlations in Latvia (-.01), Lithuania (.01), and the Russian Federation (.02) in PIRLS and Italy (.04) in PISA. But in no case correlations are clearly negative. The weak or positive reported correlations suggest that TALK is not seriously affected by reactivity. Bivariate associations do not control for PARED.

Tables 1 and 2 report estimates of the TALK coefficient (α_2) after controlling for PARED (see equation 1). The association is positive and statistically significant ($p < .10$) in 26 of the 33 PIRLS educational systems and in all 39 PISA educational systems. In PIRLS, the association is greatest in Romania, Israel, Trinidad and Tobago, Macedonia, and New Zealand, and non-significant in Denmark, Hungary, Latvia, Lithuania, Norway, Poland, and the Russian Federation. Non-significant results are fairly consistent with the correlation analysis. In PISA, the association is greatest in Bulgaria, Denmark, and Hong Kong, and lowest in Thailand, Israel, Romania and Italy.

Estimates of the PARED x TALK interaction (α_3) in Tables 1 and 2 indicate whether the association with TALK changes by PARED. In PIRLS, the PARED x TALK coefficient is positive in 5 educational systems, negative in 1, and non-significant in 27. The PARED x TALK interaction coefficient is greatest in Bulgaria and negative in the Slovak Republic. In PISA, these estimates are positive in 14 educational systems and non-significant in 25. The PARED x TALK interaction coefficient is greatest in Portugal and the United States and non-significant in Germany, the Czech Republic, Austria, Finland, France and Sweden, among other countries.

Table 1: PIRLS: Correlation and model estimates

Country	Correlation TALK/READ	Model estimates (unstandardized estimates)							
		PARED		TALK		PARED x TALK			
	r	*SE*	α_1	*SE*	α_2	*SE*	α_3	*SE*	
Austria	.09	(.02)	* 22.44	(1.57)	* 4.99	(1.72)	* 0.38	(1.74)	
Bulgaria	.16	(.04)	* 25.23	(2.42)	* 7.45	(2.17)	* 6.87	(2.73)	*
Chinese Taipei	.15	(.02)	* 22.56	(1.25)	* 6.50	(1.27)	* -0.20	(1.32)	
Denmark	.04	(.02)	+ 16.93	(1.58)	* 2.03	(2.59)	1.08	(2.44)	
France	.16	(.02)	* 22.45	(1.07)	* 11.60	(1.92)	* 3.79	(2.08)	+
Georgia	.13	(.02)	* 21.39	(3.55)	* 7.80	(1.50)	* 2.28	(2.44)	
Germany	.14	(.02)	* 22.48	(1.22)	* 9.18	(2.00)	* 0.41	(1.88)	
Hong Kong	.11	(.02)	* 7.52	(1.16)	* 4.59	(1.24)	* 0.84	(1.15)	
Hungary	.05	(.02)	* 32.98	(1.91)	* -0.31	(2.01)	-1.06	(2.09)	
Iceland	.14	(.02)	* 17.21	(1.79)	* 15.36	(2.93)	* 0.57	(2.61)	
Indonesia	.12	(.02)	* 22.24	(1.87)	* 5.38	(1.47)	* -1.91	(2.13)	
Iran	.21	(.03)	* 32.72	(1.72)	* 10.18	(1.96)	* -1.24	(2.26)	
Israel	.14	(.02)	* 36.17	(2.25)	* 15.60	(2.31)	* -0.52	(3.33)	
Italy	.09	(.02)	* 16.21	(1.90)	* 9.78	(2.55)	* -1.61	(3.14)	
Kuwait	.04	(.02)	+ 22.72	(1.89)	* 4.93	(2.63)	+ 1.14	(2.61)	
Latvia	-.01	(.03)	19.97	(2.35)	* -2.55	(1.87)	-2.52	(2.63)	
Lithuania	.01	(.02)	23.50	(1.48)	* 1.03	(1.69)	-1.14	(2.32)	
Macedonia	.16	(.02)	* 43.78	(2.28)	* 14.54	(2.30)	* 4.45	(2.94)	
Moldova	.12	(.03)	* 11.23	(1.63)	* 7.82	(1.86)	* 2.75	(1.77)	
Morocco	.10	(.03)	* 19.18	(4.00)	* 5.72	(1.79)	* 5.89	(3.30)	+
Netherlands	.15	(.02)	* 13.58	(0.99)	* 10.93	(1.67)	* 1.16	(1.85)	
New Zealand	.11	(.02)	* 26.38	(1.81)	* 13.64	(2.95)	* 1.91	(2.71)	
Norway	.04	(.02)	+ 21.19	(1.76)	* 3.19	(2.97)	1.88	(4.49)	
Poland	.06	(.02)	* 24.30	(1.16)	* 3.75	(2.33)	-0.70	(2.01)	
Qatar	.07	(.01)	* 17.93	(0.92)	* 5.27	(1.83)	* 1.55	(1.52)	
Romania	.27	(.04)	* 34.64	(3.63)	* 15.85	(3.77)	* -4.01	(3.38)	
Russian Federation	.02	(.02)	26.69	(2.51)	* 0.48	(1.75)	0.26	(2.03)	
Singapore	.13	(.02)	* 26.44	(1.44)	* 3.60	(1.14)	* 2.62	(1.06)	*
Slovak Republic	.15	(.04)	* 32.20	(2.10)	* 5.66	(1.80)	* -10.54	(2.05)	*
Slovenia	.07	(.02)	* 28.53	(1.31)	* 3.24	(1.90)	+ -0.21	(2.05)	
Spain	.08	(.02)	* 18.10	(1.29)	* 7.18	(2.67)	* -0.10	(2.93)	
Sweden	.09	(.02)	* 19.91	(1.84)	* 10.32	(2.79)	* 5.04	(2.65)	+
Trinidad and Tobago	.13	(.02)	* 29.56	(2.42)	* 14.69	(3.08)	* 4.45	(2.83)	

$^{+}p < .1$, $^{*}p < .05$.

Table 2: PISA: Correlation and model estimates

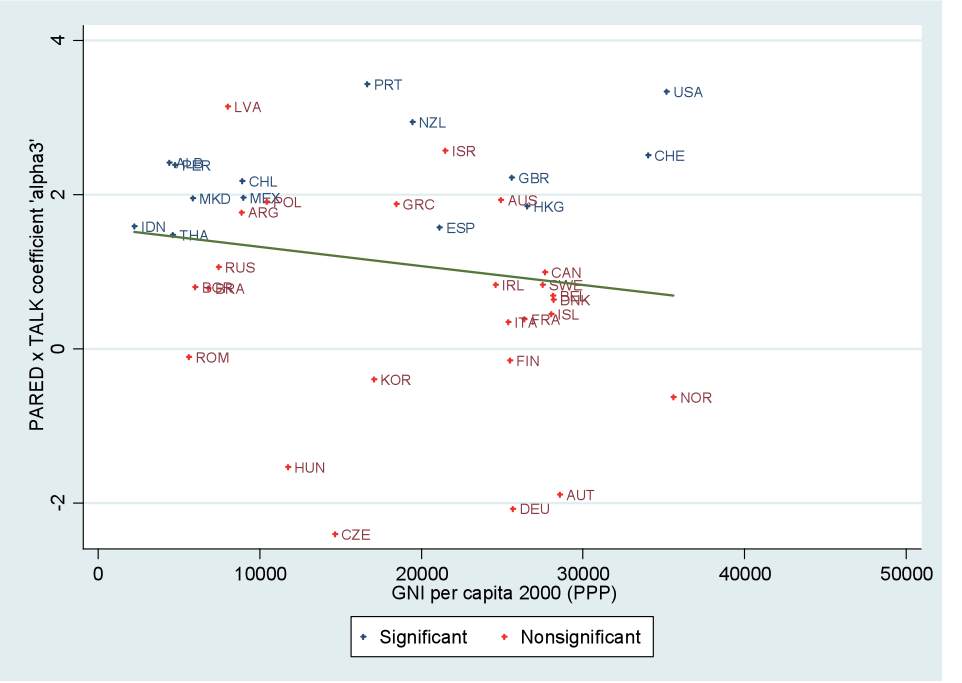
Country	Correlation TALK/READ	Model estimates (unstandardized estimates)							
		PARED		TALK		PARED x TALK			
	r	*SE*	α_1	*SE*	α_2	*SE*	α_3	*SE*	
Albania	.22	(.02)	* 22.07	(1.87)	* 15.03	(1.78)	* 2.42	(1.19)	*
Argentina	.19	(.04)	* 20.03	(2.19)	* 13.38	(3.47)	* 1.77	(2.16)	
Australia	.17	(.02)	* 22.50	(1.66)	* 12.67	(1.59)	* 1.93	(1.35)	
Austria	.15	(.02)	* 19.80	(1.49)	* 9.31	(1.44)	* -1.89	(1.15)	
Belgium	.09	(.02)	* 24.51	(1.70)	* 7.52	(1.59)	* 0.69	(1.09)	
Brazil	.20	(.02)	* 14.90	(1.35)	* 10.16	(1.12)	* 0.79	(0.77)	
Bulgaria	.23	(.02)	* 46.57	(3.48)	* 25.10	(2.15)	* 0.81	(3.10)	
Canada	.16	(.01)	* 20.98	(0.94)	* 11.55	(0.77)	* 0.99	(0.62)	
Chile	.19	(.01)	* 25.02	(1.39)	* 14.62	(1.42)	* 2.18	(1.22)	*
Czech Republic	.13	(.02)	* 43.99	(3.05)	* 9.95	(2.27)	* -2.40	(2.48)	
Denmark	.19	(.02)	* 29.20	(1.67)	* 16.47	(1.90)	* 0.64	(1.67)	
Finland	.12	(.02)	* 13.07	(1.12)	* 13.22	(2.34)	* -0.15	(1.47)	
France	.11	(.02)	* 16.66	(1.36)	* 8.39	(1.67)	* 0.39	(1.16)	
Germany	.16	(.02)	* 33.05	(2.76)	* 10.86	(1.66)	* -2.07	(2.30)	
Greece	.12	(.02)	* 15.73	(1.75)	* 10.23	(2.39)	* 1.88	(1.26)	
Hong Kong	.25	(.02)	* 11.63	(1.54)	* 15.46	(1.41)	* 1.85	(0.96)	+
Hungary	.09	(.02)	* 44.49	(2.33)	* 11.02	(2.84)	* -1.54	(2.89)	
Iceland	.19	(.02)	* 12.36	(1.17)	* 12.78	(1.36)	* 0.45	(1.15)	
Indonesia	.28	(.02)	* 9.57	(1.59)	* 11.34	(1.23)	* 1.59	(0.74)	*
Ireland	.15	(.02)	* 11.64	(1.37)	* 12.14	(1.50)	* 0.83	(0.91)	
Israel	.08	(.03)	* 29.31	(2.89)	* 4.37	(1.99)	* 2.57	(1.69)	
Italy	.04	(.02)	+ 19.08	(1.86)	* 5.22	(2.69)	+ 0.35	(1.70)	
Korea	.34	(.02)	* 10.59	(0.94)	* 14.61	(0.94)	* -0.39	(0.63)	
Latvia	.14	(.03)	* 23.78	(2.88)	* 13.26	(2.67)	* 3.15	(2.58)	
Mexico	.16	(.02)	* 19.13	(1.58)	* 8.25	(1.23)	* 1.96	(0.81)	*
Macedonia	.24	(.02)	* 27.38	(1.21)	* 14.98	(1.71)	* 1.95	(0.90)	*
New Zealand	.17	(.02)	* 17.54	(1.73)	* 13.85	(1.55)	* 2.95	(1.23)	*
Norway	.16	(.02)	* 13.11	(1.76)	* 14.56	(1.54)	* -0.62	(1.31)	
Peru	.18	(.02)	* 21.86	(1.46)	* 9.39	(1.45)	* 2.39	(0.76)	*
Poland	.14	(.02)	* 40.55	(3.69)	* 8.47	(1.73)	* 1.91	(1.97)	
Portugal	.13	(.02)	* 14.89	(1.73)	* 14.10	(2.24)	* 3.44	(1.34)	*
Romania	.08	(.02)	* 17.42	(1.86)	* 5.01	(1.84)	* -0.10	(1.50)	
Russian Federation	.12	(.02)	* 21.20	(2.55)	* 12.13	(1.64)	* 1.07	(1.96)	
Spain	.14	(.02)	* 15.65	(0.89)	* 9.30	(1.24)	* 1.58	(0.79)	*
Sweden	.09	(.02)	* 13.45	(1.64)	* 6.50	(1.40)	* 0.83	(1.37)	
Switzerland	.19	(.02)	* 20.09	(1.48)	* 14.78	(1.66)	* 2.52	(1.15)	*
Thailand	.07	(.02)	* 13.02	(1.69)	* 3.06	(1.06)	* 1.48	(0.78)	+
United Kingdom	.14	(.01)	* 21.94	(1.46)	* 12.39	(1.46)	* 2.22	(1.13)	*
United States	.15	(.02)	* 29.97	(2.67)	* 11.25	(2.19)	* 3.34	(1.48)	*

$^{+}p < .1$, $^{*}p < .05$.

4.2 Associations at the between-country level

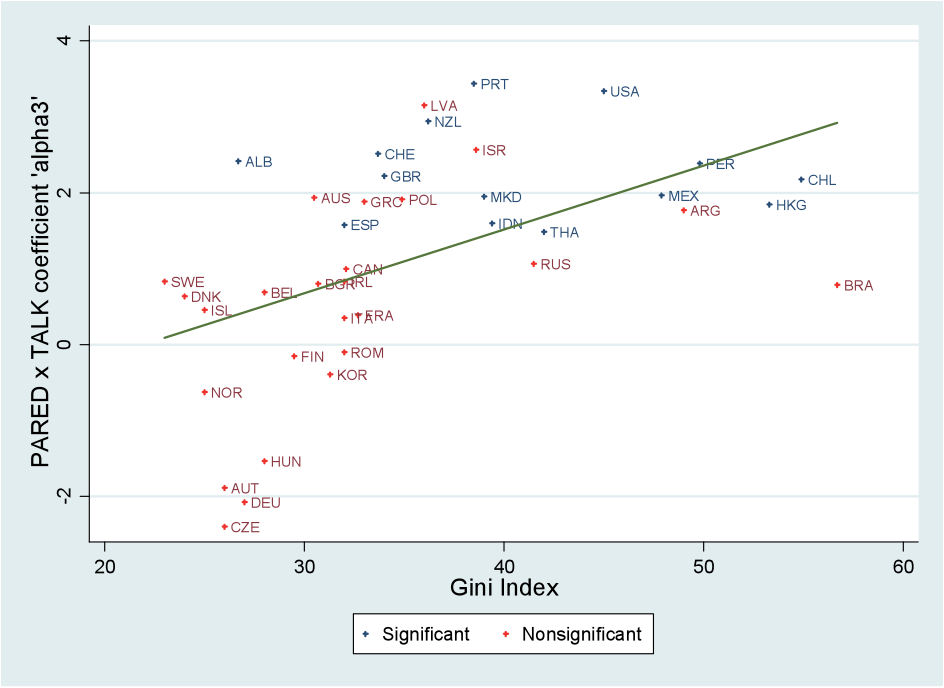
The association of the PARED x TALK interaction coefficient and country economic indicators was evaluated in PIRLS and PISA. In PIRLS, associations yielded positive but very small correlation coefficients with national income per capita and income inequality (.09 with GNI and .12 with GINI, respectively). The educational systems in PISA reported stronger associations, negative for national income and positive for income inequality (-.17 for GNI and .51 for GINI, respectively). Figures 1 and 2 depict the association with national income per capita and income inequality in PISA.

Figure 1: PISA: Association of the PARED x TALK interaction and national income per capita (GNI)



As with the PIRLS results, the associations in PISA provide weak evidence for a differential association by GNI. More consistent is the association with GINI, indicating that the interaction of PARED and TALK is greater in more unequal societies. For instance, estimates of the PARED x TALK coefficient in PISA are greater in Peru, Chile, Mexico, Hong Kong, and the United States than in the Scandinavian countries, Czech Republic, France, and Germany (see Table 2 and Figure 2). In fact, the interaction coefficient (α_3) is statistically non-significant in the latter countries.

Figure 2: PISA: Association of the PARED x TALK interaction and income inequality (GINI)



4.3 Three-level model estimates

Three-level model estimates for the complete international samples in PIRLS and PISA are reported in Tables 3 and 4, respectively. Fixed-effects estimates are reported in terms of unstandardized regression coefficients and random-effects estimates in variance components. Model 0 partitions the variance in reading achievement into the level 1 (students), level 2 (schools), and level 3 (countries) components. In PIRLS, most of differences in reading achievement occur at the country (40 %) and student level (42 %), whereas in PISA the country level explains only 24 % of differences and most differences are accounted for by the student (44 %) and school level (33 %).

Table 3: PIRLS: Three-level model regressions of reading performance on parent-child communication, parental education, and country economic indicators (unstandardized estimates)

	PIRLS 2006											
	(0)		(1)		(2)		(3)		(4)		(5)	
Fixed effects												
PARED		16.83	(0.97) *	16.45	(0.96) *	16.46	(0.96) *	16.46	(0.96) *	16.75	(0.85) *	
TALK				4.72	(0.71) *	4.77	(0.67) *	4.77	(0.67) *	5.17	(0.70) *	
PARED x TALK						0.16	(0.52)	0.16	(0.52)	0.47	(0.49)	
ln(GNI per capita)								18.88	(17.85)	18.84	(18.02)	
GINI								-1.10	(1.43)	-1.12	(1.37)	
PARED x ln(GNI)										0.06	(1.55)	
PARED x GINI										-0.21	(0.17)	
TALK x ln(GNI)										-0.14	(0.61)	
TALK x GINI										-0.08	(0.09)	
PARED x TALK x ln(GNI)										0.48	(0.51)	
PARED x TALK x GINI										0.04	(0.06)	
Random effects (σ^2)												
Level 1	4448.00	4210.06		4200.77		4200.76		4200.76		4168.93		
Level 2	1842.41 *	1479.21 *		1466.22 *		1466.04 *		1466.02 *		1444.45 *		
Level 3	4214.88 *	4194.27 *		4191.80 *		4192.24 *		3777.79 *		3799.60 *		
PARED										21.55 *		
TALK										11.60 *		
PARED X TALK										4.63 *		

$^{+}p < .1$, $^{*}p < .05$.

Table 4: PISA: Three-level model regressions of reading performance on parent-child communication, parental education, and country economic indicators (unstandardized estimates)

	PISA 2000					
	(0)	(1)	(2)	(3)	(4)	(5)
Fixed effects						
PARED		7.02 (1.27) *	6.66 (1.22) *	6.66 (1.24) *	6.66 (1.24) *	8.05 (0.87) *
TALK			5.99 (0.67) *	6.09 (0.70) *	6.09 (0.70) *	6.01 (0.63) *
PARED x TALK				0.62 (0.30) *	0.62 (0.30) *	0.94 (0.36) *
ln(GNI per capita)					49.99 (3.88) *	50.14 (3.79) *
GINI					-1.69 (0.40) *	-1.68 (0.41) *
PARED x ln(GNI)						4.71 (1.24) *
PARED x GINI						0.08 (0.09)
TALK x ln(GNI)						2.05 (0.68) *
TALK x GINI						0.08 (0.05) +
PARED x TALK x ln(GNI)						1.02 (0.78)
PARED x TALK x GINI						0.05 (0.04)
Random effects (σ^2)						
Level 1	5139.54	5096.35	5050.15	5049.10	5049.16	5014.24
Level 2	3863.42 *	3472.57 *	3362.54 *	3362.08 *	3361.02 *	3354.06 *
Level 3	2811.30 *	2797.89 *	2800.03 *	2804.99 *	471.12 *	473.35 *
PARED						9.95 *
TALK						5.17 *
PARED X TALK						0.84 *

$^{+}p < .1$, $^{*}p < .05$.

Parental education (PARED) is positively and significantly related to reading performance in PIRLS and PISA (see model 1 in Tables 3 and 4). Before, we had seen that TALK was positively associated with reading achievement in most educational systems, even after controlling for PARED. The three-level models confirm this result for the association within schools in the international sample (see model 2 in Tables 3 and 4). Also, consistently with the results within countries, the interaction coefficient of PARED and TALK came out positive and significant in PISA, but not in PIRLS (see model 3 in Tables 3 and 4).

In PIRLS, income per capita (GNI) and income inequality (GINI) are positively and negatively related to reading performance, respectively, but associations are non-significant (see model 4 in Table 3). The associations with TALK and PARED x TALK vary significantly across PIRLS countries, but not for GNI or GINI levels (see model 5 in Table 3). Thus, cross-level interaction estimates in model 5 (see Table 3) do not provide additional information and are reported for consistency with PISA results, only.

In PISA, the association of reading achievement with the natural logarithm of GNI and GINI is statistically significant: positive and negative, respectively (see model 4 in Table 4). As with the PIRLS results, the TALK, PARED, and PARED x TALK coefficients vary significantly between countries (see Tables 1 and 2). The association with TALK and PARED increases for higher levels of GNI, but the interaction of PARED and TALK is not mediated by national income indicators.

5. Discussion

This paper was motivated by the hypothesis that the influence of parental involvement by SES varied at the within- and between-country levels. Specifically, drawing on related theoretical work, parental involvement was expected to be more effective for school success among higher SES families, at the within-country level, but its influence was expected to be greater in lower SES countries, at the between-country level. The presented analyses are not sufficient to evaluate this hypothesis comprehensively, but they provide important evidence in this direction by examining patterns of the association of reading achievement and parent-child communication by levels of parental education in 33 primary school systems (PIRLS 2006) and 39 secondary school systems (PISA 2000).

The results indicate a positive interaction of parent-child communication and parental education in 5 primary school systems (PIRLS) and 14 secondary school systems (PISA), including the U.S. Three-level models confirm this result for the complete PISA international sample. This finding is in agreement with studies in the U.S. suggesting that the importance of parent-child communication and other forms of parental involvement is greater among higher SES families (e.g., Desimone, 1999; McNeal, 1999; Kim et al., 2009; Lee & Bowen, 2006). PIRLS results for primary schools appear to be less consistent, but one cannot argue that

the interaction of parent-child communication and parental education is weaker in primary schools (PIRLS) than in secondary schools (PISA). Participating countries and underlying methods are different in PIRLS and PISA and therefore results are not comparable. In fact, the majority of countries where the interaction was positive in PISA did not participate in PIRLS or lacked data on key variables, like the U.S.

Importantly, regression estimates of the interaction do not control for other variables. It could be, for example, that the greater association with parent-child communication for higher levels of parental education is fully mediated by parental occupational status or family cultural capital. That is, parents employed in higher status occupations or with higher cultural capital engage more often in conversations with children and are more capable of passing human capital on to children. If that is the case, these family characteristics and not parent-child communication explain the greater association with parent-child communication. Also, for the country regression estimates, it could be that positive interactions reflect the importance of school composition and not of families if associations with omitted school composition variables are captured by the interaction coefficient. But while omitting school composition variables likely introduces a bias in the estimates of the association with parental education and parent-child communication, the school SES less likely covaries with the interaction. Accordingly, unreported analysis controlling for school effects conveyed similar findings and within-school estimates of three-level models also yield a significant and positive interaction in the PISA international sample.

In any case, regressions do not control for other possible explanations for the findings, as it is assumed that such explanations cannot be provided with the cross-sectional data of the international assessments utilized. From this perspective, the regression analysis is regarded as providing only correlational information on how the association with parent-child communication changes for the sample of students whose parents have attained higher and lower levels of education. But these associations ought to be studied with more appropriate methods that enable identifying effects of parent-child communication and possible mediating variables.

The strength of the interaction of parent-child communication and parental education varied significantly across PIRLS and PISA countries, but no clear pattern emerged for the country's national income. The PISA data provided only weak evidence of a slight negative association with national income and a stronger positive association with income inequality. But these associations were not confirmed by three-level models. It was shown, though, that the interaction was significant in some countries with relatively low income and high income inequality and not in other more affluent societies. For instance, the interaction was positive in Peru, Chile, Mexico, and Indonesia, but not in the Scandinavian countries, the Czech Republic, France, and Germany.

It may be that, in some countries at least, the national economic environment conditions the interaction of parent-child communication and parental education, with students in poorer societies reaping greater rewards of parent-child commu-

nication than their counterparts in wealthier societies. Probably, as posited by the public resources substitution theory (Blossfeld & Shavit, 1993), the greater quality and quantity of public resources reduces the importance of family communication resources in richer countries, whereas in poorer societies students compensate for the lack of public resources by relying more heavily on family ties and social networks. But the results of this paper cannot confirm this thesis and other explanations are plausible.

For example, that it is not income levels but inequality of distribution what mainly conditions the interaction of parent-child communication and parental education. Chiu (2010) expected family resources to be more important in unequal societies because students tend to cooperate less with each other. Our results are consistent with this argument. For example, the U.S. has the second highest interaction coefficient and shows inequality levels comparable to those of the Latin American countries. But unlike the Latin American countries, the U.S. has the second highest income per capita in the PISA analytic sample. Another explanation is that specific cultural values that vary across nations explain the association with parent-child communication, for example, with some societies holding more collectivistic values and other more individualistic ones. Yet another explanation is that the stronger interactions in more unequal societies reflect differences in school SES. But in the PISA sample between-school gaps related to SES are greatest in Germany, Bulgaria, Belgium, and Austria, all countries where the interaction coefficient is non-significant.

5.1 Limitations and further research

Several limitations constrain generalizability of the results and suggest alternative explanations for the findings. One is the cross-sectional design. Cross-sectional datasets can establish associations but not the direction of causation. One cannot conclude that the influence of parent-child communication is greater when parents have higher levels of education, but only that the association is stronger for higher levels of education, as there could be other individual or family aspects related to parent-child communication that strengthen the association and that are not possible to control with this research design. Greater control, evidence of causation, and understanding of the mechanisms at work would only be possible with a randomized experiment where, for example, treated families are encouraged to communicate more often and control families are not.

A related limitation is reactivity of the parent-child communication items. A negative correlation with reading achievement was found for certain items, suggesting that parents reacted to poor school performance with more involvement. Several items had to be excluded from the analysis to avoid reactivity. That is the reason why a parent-child communication scale could not be constructed and the analyses had to rely ultimately on a single parent-child communication item (TALK), which was weakly, but positively related to reading achievement. The sin-

gle-item analysis is weaker compared to approaches based on a reliable scale and, furthermore, the selected item might still be affected by reactivity to some degree.

Future research should identify the reasons for negative correlations with parental involvement items, because longitudinal studies have shown that it cannot be attributed to reactivity alone. For example, researchers could analyze with longitudinal data how the association with parent-child communication items changes before and after controlling for prior achievement. Such analyses could help disentangle the extent of the association attributed to reactivity from that related to the actual influence of parent-child communication. With that, we could gain a better understanding of the mechanisms for the negative influence of parental involvement and/or improve survey development of large scale assessment studies by proposing less reactive parent-child communication questions (see also Jungbauer-Gans, 2004). Survey developers could also consider including questions related to other theoretically relevant aspects of parental involvement, like parenting styles, parent-school relationships, and parent-parent relationships (Park, 2008).

Another limitation is related to the reliability of variables. In PIRLS, parental education and parent-child communication variables are reported by parents, but in PISA these data are reported by students. Studies with PISA data show that student reports, particularly those of low performing students, tend to be less reliable than parent reports and that the reliability of student reports also varies by country (Kreuter, Eckman, Maaz, & Watermann, 2010; Schulz, 2005). Also another caveat should be borne in mind while interpreting tests of statistical significance. Sample sizes are quite large, ranging from about 3,000 to 10,000 students across participating educational systems in PIRLS and PISA. Furthermore, the Canadian sample in PISA consists of about 30,000 students. The large sample sizes make it more likely for small effect sizes to come out statistical significant. But the interaction of parent-child communication and parental education was non-significant in Canada and no association was found between the sample size and results of significance tests. Nevertheless, the reader should be cautious and not overemphasize results of significance tests.

Still another limitation is the implicit assumption that students are passive agents. A positive interaction of parent-child communication and parental education supposedly reveals that parent-child communication is more effective among students whose parents have attained higher levels of education and that policies that promote parental involvement could actually widen the SES gap in academic achievement. But in fact students coming from families with more educated parents might already have greater educational aspirations regardless of communication at home, whereas students from less affluent families likely have lower educational expectations as they know, for example, that they will probably be deterred from applying to university due to financial constraints at home. From this perspective, even a positive interaction could reflect a greater influence of parent-child communication for lower SES than for higher SES students provided that they both had the same aspirations and opportunities.

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References

Adams, R. J., & Wu, M. L. (Eds.). (2002). *PISA 2000 technical report*. Paris: Organization for Economic Co-Operation and Development.

Barnard, W. M. (2004). Parent involvement in elementary school and educational attainment. *Child and Youth Services Review, 26*, 39–62.

Bassani, C. (2006). A test of social capital theory outside of the American context: Family and school social capital and youths' math scores in Canada, Japan, and the United States. *International Journal of Educational Research, 45,* 380–403.

Blossfeld, H. P., & Shavit, Y. (1993). Persisting barriers. In Y. Shavit & H. P. Blossfeld (Eds.), *Persistent inequality* (pp. 1–23). Boulder, CO: Westview.

Callahan, K., Rademacher, J. A., & Hildreth, B. L. (1998). The effect of parent participation in strategies to improve the homework performance of students who are at risk. *Remedial and Special Education, 19*, 131–141.

Chen, X., & Chandler, K. A. (2001). *Efforts by public K–8 schools to involve parents in children's education: Do school and parent reports agree?* (NCES 2001-076). Washington, DC: U.S. Government Printing Office.

Chiu, M. M. (2010). Effects of inequality, family and school on mathematics achievement: Country and student differences. *Social Forces, 88* (4), 1645–1676.

Chiu, M. M., & Xihua, Z. (2008). Family and motivation effects on mathematics achievement: Analyses of students in 41 countries. *Learning and Instruction, 18*, 321–336.

Coleman, B., & McNeese, M. N. (2009). From home to school: The relationship among parental involvement, student motivation, and academic achievement. *The International Journal of Learning, 16* (7), 459–470.

Cooper, H. (2001). Homework for all – in moderation. *Educational Leadership, 58*, 34–38.

Crosnoe, R. (2001). Academic orientation and parental involvement in education during high school. *Sociology of Education, 74*, 210–230.

Desimone, L. (1999). Linking parental involvement with student achievement: Do race and income matter? *Journal of Educational Research, 93*, 11–30.

Domina, T. (2005). Leveling the home advantage: Assessing the effectiveness of parental involvement in elementary school. *Sociology of Education, 78*, 233–249

Dufresne, A., & Kobasigawa, A. (1989). Children's spontaneous allocation of study time: Differential and sufficient aspects. *Journal of Experimental Child Psychology, 42*, 274–296.

Englund, M. M., Luckner, A. E., Whaley, G. J., & Egeland, B. (2004). Children's achievement in early elementary school: Longitudinal effects of parental involvement, expectation, and quality of assistance. *Journal of Educational Psychology, 96*, 723–730.

Epstein, J. L. (1987). Parent involvement: What research says to administrators. *Education and Urban Society, 19* (2), 119–136.

Erikson, E. (1968). *Identity: Youth and crisis*. New York: Norton.

Fan, X. (2001). Parental involvement and students' academic achievement: A growth modeling analysis. *The Journal of Experimental Education, 70* (1), 27–61.

Fan, X., & Chen, M. (2001). Parental involvement and students' academic achievement: A meta-analysis. *Educational Psychology Review, 13* (1), 1–22.

Foy, P., & Kennedy, A. M. (2008). *PIRLS 2006 user guide for the international database*. Chestnut Hill, MA: Boston College.

Gelman, A., Carlin, J. B., Stern, H. S., & Rubin, D. B. (2004). *Bayesian data analysis* (2nd ed.). London: Chapman & Hall/CRC.

Gregory, A., & Rimm-Kaufman, S. (2008). Positive mother – child interactions in kindergarten: Predictors of school success in high school. *School Psychology Review, 37* (4), 499–515.

Gutman, L. M., & Midgley, C. (2000). The role of protective factors in supporting the academic achievement of poor African American students during the middle school transition. *Journal of Youth and Adolescence, 29*, 223–248.

Haig, B. D. (2005). Explanatory factor analysis. Theory generation, and scientific method. *Multivariate Behavioral Research, 40* (3), 303–329.

Hill, J. P., & Holmbeck, G. N. (1986). Attachment and autonomy during adolescence. In G. J. Whitehurst (Ed.), *Annals of child development*. (vol. 3, pp. 145–189). Greenwich, CT: JAI Press.

Hong, S., & Ho, H.-Z. (2005). Direct and indirect longitudinal effects of parental involvement on student achievement: Second-order latent growth modeling across ethnic groups. *Journal of Educational Psychology, 97* (1), 32–42.

Hong, S., Yoo, S. K., You, S., & Wu, C. C. (2010). The reciprocal relationship between parental involvement and mathematics achievement: Autoregressive cross-lagged modeling. *The Journal of Experimental Education, 78*, 419–439

Hoover-Dempsey, K. V., Battiato, A. C., Walker, J. M. T., Reed, R. P., DeJong, J. M., & Jones, K. P. (2001). Parental involvement in homework. *Educational Psychologist, 36*, 195–209.

Houtenville, A., & Conway, K. (2008). Parental effort, school resources, and student achievement. *Journal of Human Resources, 43* (2), 437–453.

IEA – International Association for the Evaluation of Educational Achievement. (2011). *International database analyzer* (version 2.0). Hamburg, Germany: IEA Data Processing and Research Center.

Jeynes, W. H. (2005). Effects of parental involvement and family structure on the academic achievement of adolescents. *Marriage & Family Review, 37* (3), 99–116.

Jeynes, W. H. (2007). The relationship between parent involvement and urban school student academic achievement: A meta-analysis. *Urban Education, 42*, 82–110.

Jungbauer-Gans, M. (2004, August). *The influence of social and cultural capital on reading achievement – An international comparison and analysis of the PISA 2000 data*. Paper presented at the annual meeting of the American Sociological Association, San Francisco, CA.

Kim, S., Hwang, Y., & Shin, S. (2009, March). *Effect of social capital on academic achievement: Focusing on interaction between social capital and social class*. Paper presented at the annual meeting of the 53rd Annual Conference of the Comparative and International Education Society, Charleston, SC.

Kreuter, F., Eckman, S., Maaz, K., & Watermann, R. (2010). Children's reports of parents' education level: Does it matter whom you ask and what you ask about? *Survey Research Methods, 4* (3), 127–138.

Laursen, B., Coy, K. C., & Collins, W. A. (1998). Reconsidering changes in parent child conflict across adolescence: A meta-analysis. *Child Development, 69*, 817–832.

Lee, J. S., & Bowen, N. K. (2006). Parental involvement, cultural capital, and the achievement gap among elementary school children. *American Educational Research Journal, 43*, 193–218.

Levpušček, M., & Zupančič, M. (2009). Math achievement in early adolescence: The role of parental involvement, teachers' behavior, and students' motivational beliefs about math. *Journal of Early Adolescence, 29* (4), 541–570.

Martin, M. O., Mullis, I. V. S., & Kennedy, A. M. (Eds.). (2007). *PIRLS 2006 technical report*. Chestnut Hill, MA: Boston College.

Martinez-Pons, M. (1996). Test of a model of parental inducement of academic self-regulation. *Journal of Experimental Education, 64*, 213–227.

Mattingly, D. J., Prislin, R., McKenzie, T. L., Rodriguez, J. L., & Kayzar, B. (2002). Evaluating evaluations: The case of parent involvement programs. *Review of Educational Research, 72* (4), 549–576.

McNeal, R. B. (1999). Parental involvement as social capital: Differential effectiveness on science achievement, truancy, and dropping out. *Social Forces, 78*, 117–144.

McWayne, C., Hampton, V., Fantuzzo, J., Cohen, H. L., & Sekino, Y. (2004). A multivariate examination of parent involvement and the social and academic competencies of urban kindergarten children. *Psychology in the Schools, 41*, 363–377.

Meehan, B. T., Hughes, J. N., & Cavell, T. A. (2003). Teacher-student relationships as compensatory resources for aggressive children. *Child Development, 74*, 1145–1157.

Muller, C. (1995). Maternal employment, parent involvement, and mathematics achievement among adolescents. *Journal of Marriage and Family, 57*, 85–100.

Muller, C. (1998). Gender differences in parental involvement and adolescents' mathematics achievement. *Sociology of Education, 71*, 336–356.

Niggli, A., Trautwein, U., Schnyder, I., Ludtke, O., & Neumann, M. (2007). Parental homework support can be beneficial, but parental intrusion is detrimental: Family background, parental homework supervision, and performance gains. *Psychologie in Erziehung und Unterricht, 54*, 1–14.

Park, H. (2008). The varied educational effects of parent-child communication: A comparative study of fourteen countries. *Comparative Education Review, 52* (2), 219–243.

Patall, E. A., Cooper, H., & Robinson, J. C. (2008). Parent involvement in homework: A research synthesis. *Review of Educational Research, 78* (4), 1039–1101.

Pomerantz, E. M., & Eaton, M. M (2001). Maternal intrusive support in the academic context: Transactional socialization processes. *Developmental Psychology, 37*, 174–186.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Rogers, M. A., Theule, J., Ryan, B. A., Adams, G. R., & Keating, L. (2009). Parental involvement and children's school achievement evidence for mediating processes. *Canadian Journal of School Psychology, 24* (1), 34–57.

Rubin, D. B. (1987). *Multiple imputation for nonresponse in surveys*. New York: J. Wiley & Sons.

Schulz, W. (2005, April). *Measuring the socio-economic background of students and its effect on achievement in PISA 2000 and PISA 2003*. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA.

Simpkins, S. D., Weiss, H. B., McCartney, K., Kreider, H. M., & Dearing, E. (2006). Mother-child relationship as a moderator of the relation between family educational involvement and child achievement. *Parenting: Science and Practice, 6*, 49–57.

Singh, K., Bickley, P. G., Trivette, P., Keith, T. Z., Keith, P. B., & Anderson, E. (1995). The effects of four components of parental involvement on eight-grade student achievement: Structural analysis of NELS-88 data. *School Psychology Review, 24*, 299–317.

StataCorp. (2009). *Stata: Release 11* [Computer software]. College Station, TX: StataCorp LP.

Zill, N., & Nord, C. W. (1994). *Running in place: How American families are fairing in a changing economy and an individualistic society*. Washington, DC: Child Trends Inc.